

04-20-00

A

EXPRESS MAIL CERTIFICATE

Date 4/19/00 Label No. 508339715

I hereby certify that, on the date indicated above I deposited this paper or fee with the U.S. Postal Service and that it was addressed for delivery to the Commissioner of Patents & Trademarks, Washington, DC 20231 by "Express Mail Post Office to Addressee" service.

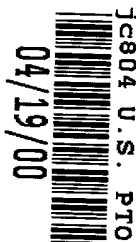
D B Peck

Name (Print)

D B Peck

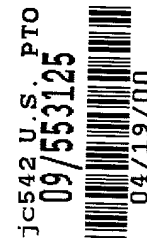
Signature

PLEASE CHARGE ANY DEFICIENCY OR
CREDIT ANY EXCESS IN FEES DUE WITH
RESPECT TO THIS APPLICATION TO
LUCENT TECHNOLOGIES, INC.
DEPOSIT ACCOUNT NO. 12-2325



DARBY & DARBY P.C.

805 Third Avenue
New York, New York 10022
212-527-7700



File No: 1298/OF148
CANNON 60-10-57-12

Date: April 19, 2000

Hon. Commissioner of
Patents and Trademarks
Washington, DC 20231

Sir:

Enclosed please find an application for United States patent as identified below:

Inventor/s (name ALL inventors): Joseph M. CANNON,
Lakshmi Narayana JAMPANABOYANA
James A. JOHANSON,
Philip David MOONEY

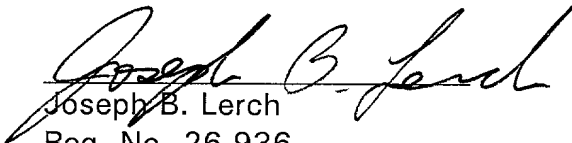
Title: METHOD AND APPARATUS PROVIDING CALLER IDENTIFICATION TELEPHONE
SERVICE WITH A REAL TIME AUDIO MESSAGE

including the items indicated:

1. Specification and 12 claims: 4 indep.; 8 dep.; _ multiple dep.
2. [X] Executed Declaration and power of attorney
3. [X] Formal drawings, 4 sheets (Figs. 1-5)
4. [X] Assignment for recording to: LUCENT TECHNOLOGIES INC.

5. [X] Charge LUCENT TECHNOLOGIES INC. Deposit Account No. 12-2325
\$808.00 for the filing fee and recording of assignment.

Respectfully submitted,


Joseph B. Lerch
Reg. No. 26,936
Attorney for Applicant(s)

(D&DForms/PTO-1)

EXPRESS MAIL CERTIFICATE

Date 4/19/00 Label No. 503339715

I hereby certify that, on the date indicated above I
 deposited this paper or fee with the U.S. Postal Service
 & that it was addressed for delivery to the Commissioner
 of Patents & Trademarks, Washington D.C. 20231 by
 "Express Mail Post Office to Addressee" service.

Name (Print) D B PeckSignature [Signature]

5

10

METHOD AND APPARATUS PROVIDING CALLER IDENTIFICATION TELEPHONE SERVICE WITH A REAL TIME AUDIO MESSAGE

Field of the Invention

The present invention relates generally to a method and apparatus for
 15 providing caller identification in telephone systems and, more particularly, concerns
 providing a real time audio message in a telephone system before a connection is
 established between a calling party and a called party.

Background of the Invention

20 Today, calling party identification (Caller ID) service is widely available
 in most industrialized countries. A fundamental method and apparatus for
 providing Caller ID service in a telephone communication system are disclosed in
 U.S. Patent No. 4,551,581 granted November 5, 1985 to C.A. Doughty, and a
 fundamental method and apparatus for receiving Caller ID information at a
 25 telephone receiver are disclosed in U.S. patent No. 4,582,956 granted to C.A.
 Doughty on April 15, 1986. The disclosures of these patents are incorporated
 herein by reference.

Conventional Caller ID equipment provides an identification of the
 calling party to the called party's telephone customer premises equipment before
 30 a telephone connection is established. That is, the Caller ID information is provided
 to the called party while his telephone equipment remains in an "on-hook" state.

Specifically, the central office alerts a called party to an incoming message by ringing his telephone equipment. A ringing signal is applied to the telephone equipment intermittently, with a silent interval being provided between consecutive rings of telephone equipment. When the called party lifts the telephone receiver, the telephone equipment assumes an "off-hook" state, but prior to that time, it remains in an "on-hook" state. Generally, caller ID information is transmitted to the called party's telephone equipment during the "on-hook" state in the silent interval between the first and second rings, but it may come prior to the first ring, after which the Caller ID information is displayed to the called party. ,

A shortcoming of conventional Caller ID service is that it does not identify the actual calling party, but only the telephone equipment from which the call is being made. When a party is identified, it is the registered owner of the telephone equipment from which the call is being made. Thus, when the calling party calls from telephone equipment which is shared among many individuals, from a telephone at a site he is only visiting, from a pay telephone, or through a PBX, the called party cannot identify the actual calling party without going "off-hook" on his telephone equipment and speaking to the calling party. This, however, defeats the intended purpose of Caller ID service.

In accordance with the present invention, a Caller ID service is provided which permits the calling party to speak a real time audio message that can be received and played by the called party's Caller ID equipment while his telephone equipment remains in the "on-hook" state. A calling party which has Audio Caller ID (ACID) service would speak a short audio message before dialing the called party. That message is converted to digital form, optionally compressed, and transferred to the called party in a manner similar to conventional Caller ID information. The called party's Caller ID equipment operates in the conventional manner, except that the received Audio Caller ID signal is recognized as an audio signal. At the site of the called party, a decoder is provided to convert the digital

signal to an analog audio signal, and this analog signal is provided to a speaker, which plays back the calling party's audio message.

Preferably, conventional Caller ID operation is preserved when Audio Caller ID service is provided. This is achieved by sending the Audio Caller ID data in the silent interval following the second ring. The audio Caller ID equipment treats any signal received after the first ring as a conventional caller ID signal and any signal received after the second ring as an Audio Caller ID signal. An Audio Caller ID receiver could then store conventional Caller ID information in the conventional manner (i.e. allowing the called party to view information about a predetermined number of received calls), while also permitting an audio message or clip to be stored in association with each call. The Audio caller ID may also be sent during rings or regardless of rings.

Brief Description of the Drawings

The foregoing brief description, as well as other features and advantages of the present invention, will be understood more completely from the following detailed description of a presently preferred, but nonetheless illustrative, embodiment, with reference being had to the accompanying drawings, in which:

Fig. 1 is a waveform diagram representing the operating signals in a conventional Caller ID system;

Fig. 2 illustrates the message format in a conventional Caller ID system;

Fig. 3 is a functional block diagram illustrating the structure of a conventional Caller ID receiver;

Fig. 4 is a functional block diagram illustrating a preferred embodiment of an Audio Caller ID receiver in accordance with the present invention; and

Fig. 5 is a functional block diagram illustrating a preferred embodiment of an Audio Caller ID transmitter in accordance with the present invention.

Detailed Description of the Preferred Embodiment

Turning now to Fig. 1, there is illustrated a waveform representing the operating signals in a conventional Caller ID system, all signals being plotted against time. These are the signals typically produced at the central office and presented to the called party's telephone customer premises equipment. Signals 10 and 12 represent the first and second ring signals, which are separated by a first silent interval 14. Each ringing signal is typically a 20Hz, 86 volt RMS sine wave superimposed on -48 volts and is produced at the central office on the ring lead to indicate to a customer's called telephone equipment that a telephone call is being received. Each ringing signal has a duration of approximately two seconds, and the silent interval is approximately four seconds. Although not shown in Fig. 1, it will be understood that in the conventional telephone system ringing signal 12 is followed by a second silent interval, a third ringing signal, a third silent interval, etc. These ringing signals and silent intervals continue until the called party's telephone equipment goes off-hook.

In a conventional Caller ID system, Caller ID information is introduced in the first silent interval 14. The Caller ID information is in the form of a frequency shift keyed (FSK) signal received a short interval 18 after the termination of the ringing signal. Interval 18 typically has a 300-350 millisecond duration. The FSK signal 16 contains two carrier frequencies, such as 2100 and 2200 Hz, which represent the low or "0" and higher "1" logic levels, respectively, of a serial data message. During an interval 20, a continuous frequency signal, such as 2100 Hz is transmitted, to permit the Caller ID equipment and the called telephone to initialize. This is followed by an interval 22 during which a modulated FSK signal representing a data message is introduced. This data message contains the Caller ID information.

The data message is typically composed of a series of 8 bit characters each preceded by a start bit and followed by stop bit. Figure 2 illustrates a typical message format. The first character 30 identifies the type of message, such as a

calling station directory number, an alpha-numeric message, special service indication etc. The second character 32 represents the number of characters that follow. The following data characters 34 represent the actual information to be transmitted, such as the calling station directory number, and the last character 36 is a checksum character, which provides error correction.

Figure 3 is a functional block diagram of a typical prior art Caller ID receiver 40, which is connected to a telephone line L in parallel with conventional telephone receiving equipment R. Caller ID receiver 40 includes a ring detector 42, which is connected to the telephone line L and controls a normally open switch 44, which is also connected to the telephone line. At the output of switch 44, there is provided an AC coupler 46 designed to transmit FSK frequencies, but to block the low frequency ringing signal. The AC coupler is connected to an FSK demodulator 48, the output of which is provided to a convertor 49, which provides serial data as an output.

In operation, when ring detector 42 detects the first ringing signal on telephone line L, it causes switch 44 to close. The ringing signal is, however, blocked by coupler 46. On the other hand, when signals in the FSK band begin to appear on telephone line L, they are transmitted through coupler 46 to demodulator 48. The demodulator output signal is then converted by convertor 49 to a serial data stream. Typically, the serial data is provided to a display, so that the Caller ID information may be displayed to the user.

Figure 4 illustrates a preferred embodiment 50 of an Audio Caller ID receiver in accordance with the present invention. In receiver 50, components which are identical to components incorporated in receiver 40 are identified with the same reference character, operate in the same manner as in receiver 40, and will not be described further. A ring detector 42' is connected to telephone line L. This device is similar to a conventional ring detector, except that it includes a counter so that it is able to determine when the second ringing signal is received. It is assumed that receiver 50 will be providing conventional serial data in the same

manner as receiver 40, so that it will be capable of operating as conventional Caller ID receiver as well. The serial data is, however, also provided to a digital audio decoder 52, which is enabled by the second signal received from ring detector 42' over lead 51. The output of digital audio decoder 52 is provided through audio
 5 amplifier 54 to a speaker 56, or the like. It should also be appreciated that the signal from amplifier 54 could be provided to the ear piece of the telephone set when receiver 50 is part of a integrated unit incorporating a telephone receiver.

In operation, ring detector 42' will enable digital audio decoder 52 when it detects the second ring signal. Thereafter, serial data provided at the
 10 output of convertor 49 will be converted by decoder 52 from digital audio to an analog audio signal which is amplified and played over speaker 56. It should be appreciated that the serial data received by decoder 52 may be a compressed digital audio signal, in which case the decoder 52 would include the necessary components to decompress the signal prior to decoding it.

15 Figure 5 is a block diagram illustrating a preferred embodiment 60 of an audio Caller ID transmitter in accordance with the present invention. Transmitter 60 includes an enabling switch, such as a push button 62 which a user presses when he wishes to store an audio message that is to be sent to a receiver. Operating switch 62 causes a predetermined triggering signal to appear on leads
 20 61 and 63. The signal on lead 61 causes a digital audio encoder 62 to be enabled, whereby the operator may digitally encode an audio signal provided by a microphone 66 and audio amplifier 68 to encoder 64. A digital signal from encoder 64 is stored in a storage unit 70. It should be appreciated that encoder 64 may include components for compressing the digital audio signal. Storage unit 70 is
 25 connected to a converter 72, which converts digital words stored in unit 70 to a serial data stream. The serial data stream is provided through an FSK modulator 74 to a transmitter circuit 76. The output of transmitter circuit 76 is coupled to the telephone line L, and the transmitter circuit also receives a control input from

the telephone line. Also connected to telephone line L is an off-hook detector 78, which enables transmitter circuit 76.

In operation, the user preferably records an audio message prior to going off hook on his telephone transmitter. Alternatively, the user may begin
 5 recording when he hears the dial tone. He begins recording by operating the switch 62, at which point encoder 64 and transmitter circuit 76 are placed in a ready state. The user speaks into the microphone 66, whereby the audio signal is converted into a digital signal by encoder 64 and, optionally, compressed. The digital signal is stored in storage unit 70, and the user is ready to place his
 10 telephone call. Off-hook detector 78 detects when the user goes off hook and enables transmitting circuit 76. At this point, transmitting circuit 76 places a predetermined signal on the telephone line, which is recognized by the central office as indicating that a digital audio message is waiting. The central office then receives the telephone number dialed by the user in the usual manner and, when
 15 dialing is complete sends a predetermined signal over the telephone line indicating to transmitting circuit 76 that it is ready to receive the audio message. Transmitting circuit 76 detects this signal, enables convertor 72 and enables storage units 70 to output the recorded message.

Converter 72 converts the stored words from storage unit 70 into a
 20 serial data stream, which is provided to modulator 74. Modulator 74 then produces an FSK signal, which is coupled to telephone line L via AC coupler 46. This FSK signal is provided to the Audio Caller ID receiver 50 at the site of the receiving party.

The message format for Audio Caller ID messages could be similar to
 25 that of Fig. 2, except that character 30 is selected to be unique to an Audio Caller ID signal and character 32 would represent the message length in fractions of a second (e.g., 1/8 second increments).

Although preferred embodiments of the invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that many additions,

modifications and substitutions are possible, without departing from the scope and spirit of the invention as defined by the accompanying claims.

100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000

What is Claimed:

1 1. A method for communicating an audio message between a calling telephone
 2 apparatus and a called telephone apparatus while the called telephone apparatus
 3 remains in an on-hook state, each telephone apparatus being connected to a
 4 telephone system, said method comprising the step of introducing a digitized
 5 version of the audio message during a silent interval following the second ringing
 6 signal provided to the called telephone apparatus.

1 2. The method of claim 1 further comprising the step of introducing a signal
 2 identifying the calling party during the silent interval following the first ringing
 3 signal provided to the called telephone apparatus, whereby the called telephone
 4 apparatus is provided conventional Caller ID service, in addition to the audio
 5 message.

1 3. The method of claim 1 wherein the digitized version of the audio message is of
 2 sufficient duration to extend beyond the silent interval in which it begins.

1 4. A method for communicating an audio message from a calling telephone
 2 apparatus to a called telephone apparatus while the called telephone apparatus
 3 remains in an on-hook state, each telephone apparatus being connected to a
 4 telephone system, said method comprising the steps of:
 5 receiving a digitized version of the audio message during a silent interval following
 6 the second ringing signal appearing at the called telephone apparatus;
 7 converting the digitized version of the audio message to an audio version thereof;
 8 and
 9 introducing the audio version to a transducer to produce an audible version of the
 10 audio message.

1 5. The method of claim 4 further comprising the step of receiving a signal
2 identifying the calling party during the silent interval following the first ringing
3 signal appearing at the called telephone apparatus, whereby the called telephone
4 apparatus is provided conventional Caller ID service, in addition to the audio
5 message.

1 6. The method of claim 3 wherein the digitized version of the audio message is of
2 sufficient duration to extend beyond the silent interval in which it begins.

1 7. Apparatus for communicating an audio message between a calling telephone
2 apparatus and a called telephone apparatus while the called telephone apparatus
3 remains in an on-hook state, each telephone apparatus being connected to a
4 telephone system, comprising:
5 a silence detector detecting a silent interval following the second ringing signal
6 provided to the called telephone apparatus; and
7 a signal injector, responsive to the silence detector, introducing a digitized version
8 of the audio message to the called telephone apparatus during the detected silent
9 interval.

1 8. The apparatus of claim 7 further comprising a further signal injector introducing
2 a signal identifying the calling party during the silent interval following the first
3 ringing signal provided to the called telephone apparatus, whereby the called
4 telephone apparatus is provided conventional Caller ID service, in addition to the
5 audio message.

1 9. The apparatus of claim 7 wherein the signal injector introduces the digitized
2 version of the audio signal during an interval which begins during the silent interval
3 and extends beyond it.

1 10. Apparatus for communicating an audio message from a calling telephone
2 apparatus to a called telephone apparatus while the called telephone apparatus
3 remains in an on-hook state, each telephone apparatus being connected to a
4 telephone system, comprising:

5 a silence detector detecting a silent interval following the second ringing signal
6 provided to the called telephone apparatus;

7 a receiver, responsive to the silence detector, receiving a digitized version of the
8 audio message at the called telephone apparatus during the detected silent interval;
9 and.

10 a digital-to-analog converter converting the digitized version of the audio message
11 to an audio version thereof; and

12 a transducer responsive to the audio version to produce an audible version of the
13 audio message.

1 11. The apparatus of claim 10 further comprising:

2 said silence detector being constructed to also detect a silent interval following the
3 first ringing signal provided to the called telephone apparatus; and

4 a further receiver responsive to the detection by said silence detector of the silent
5 interval following the first ringing signal and, during that silent interval, receiving
6 a signal identifying the calling party, whereby the called telephone apparatus is
7 provided conventional Caller ID service, in addition to the audio message.

1 12. The apparatus of claim 10 wherein the receiver receives the digitized version
2 of the audio signal during an interval which begins during the silent interval and
3 extends beyond it.

5

10 **METHOD AND APPARATUS PROVIDING CALLER IDENTIFICATION**
 TELEPHONE SERVICE WITH A REAL TIME AUDIO MESSAGE

Abstract of the Disclosure

 An Audio Caller ID service is provided which permits the calling party
15 to speak a real time audio message that can be received and played by the called
party's Caller ID equipment while his telephone equipment remains in the "on-
hook" state. A calling party which has Audio Caller ID (ACID) service would speak
a short audio message before dialing the called party. That message is converted
to digital form, optionally compressed, and transferred to the called party in a
20 manner similar to conventional Caller ID information. The called party's Caller ID
equipment operates in the conventional manner, except that the received Audio
Caller ID signal is recognized as an audio signal. At the site of the called party, a
decoder is provided to convert the digital signal to an analog audio signal, and this
analog signal is provided to a speaker, which plays back the calling party's audio
25 message.

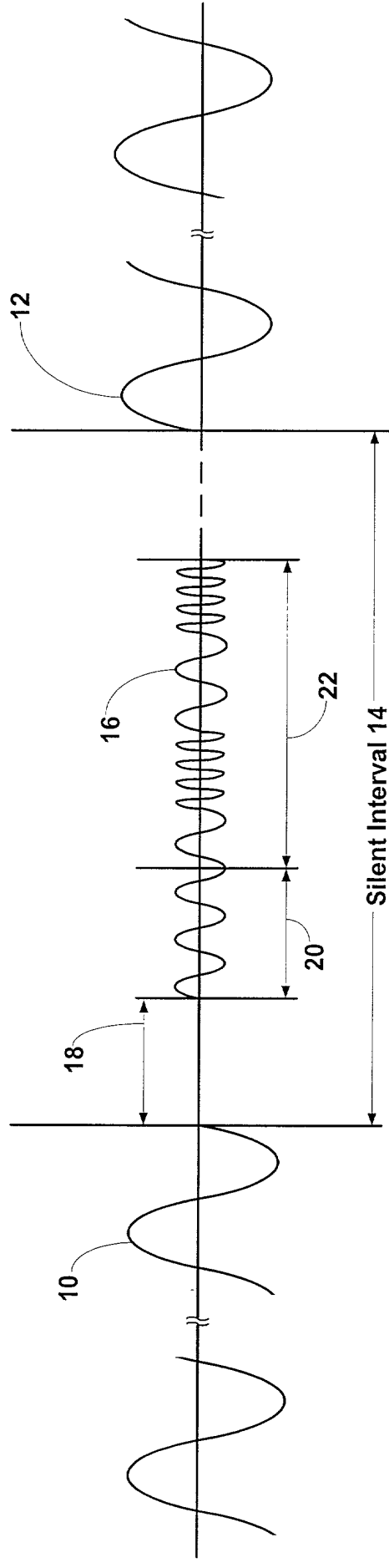
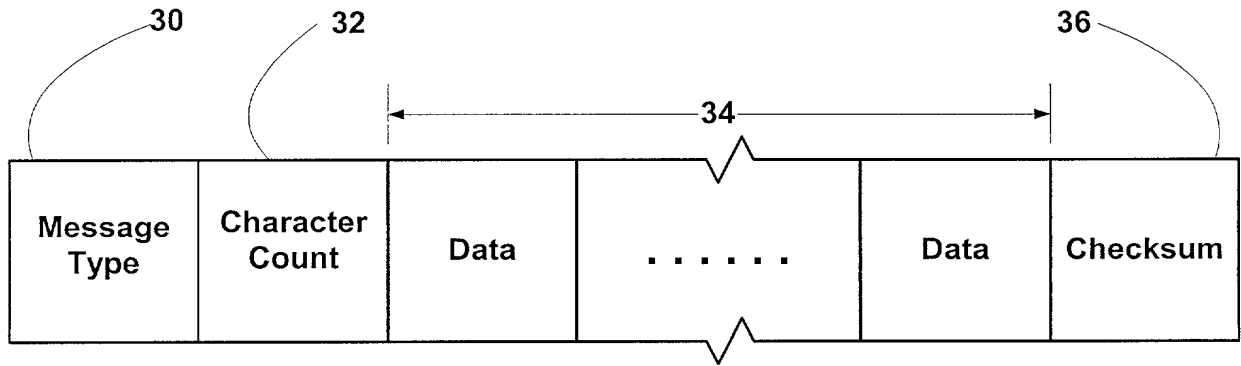
[illegible]

Fig. 1

Fig. 2



MESSAGE FORMAT

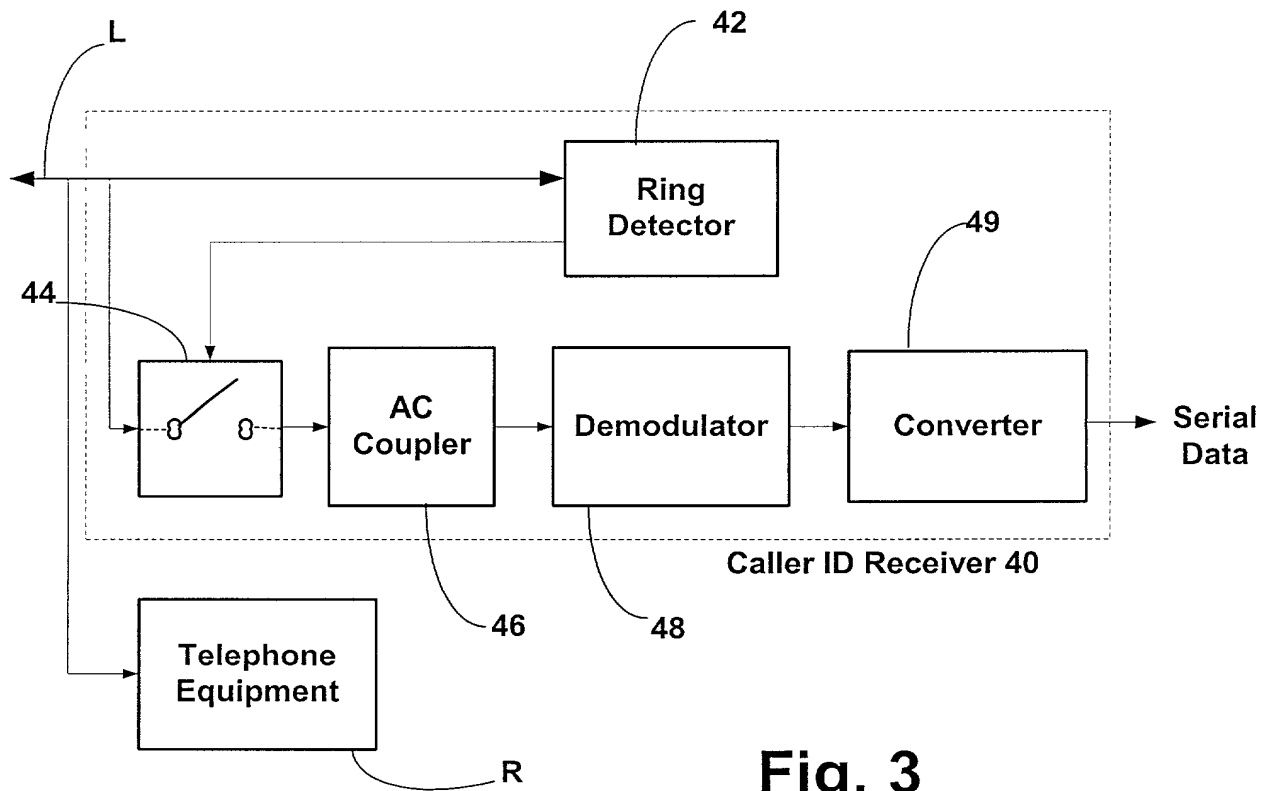


Fig. 3

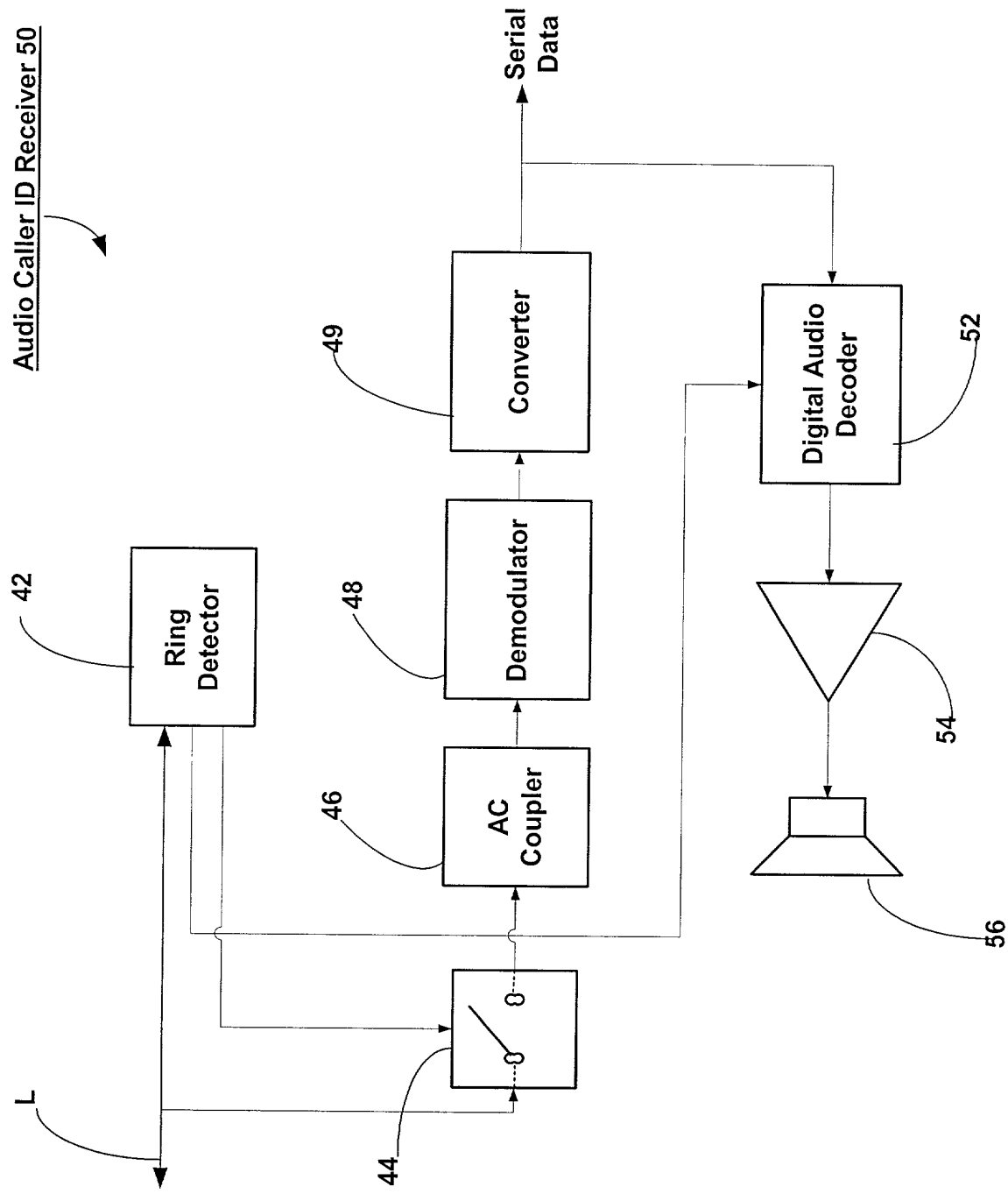


Fig.4

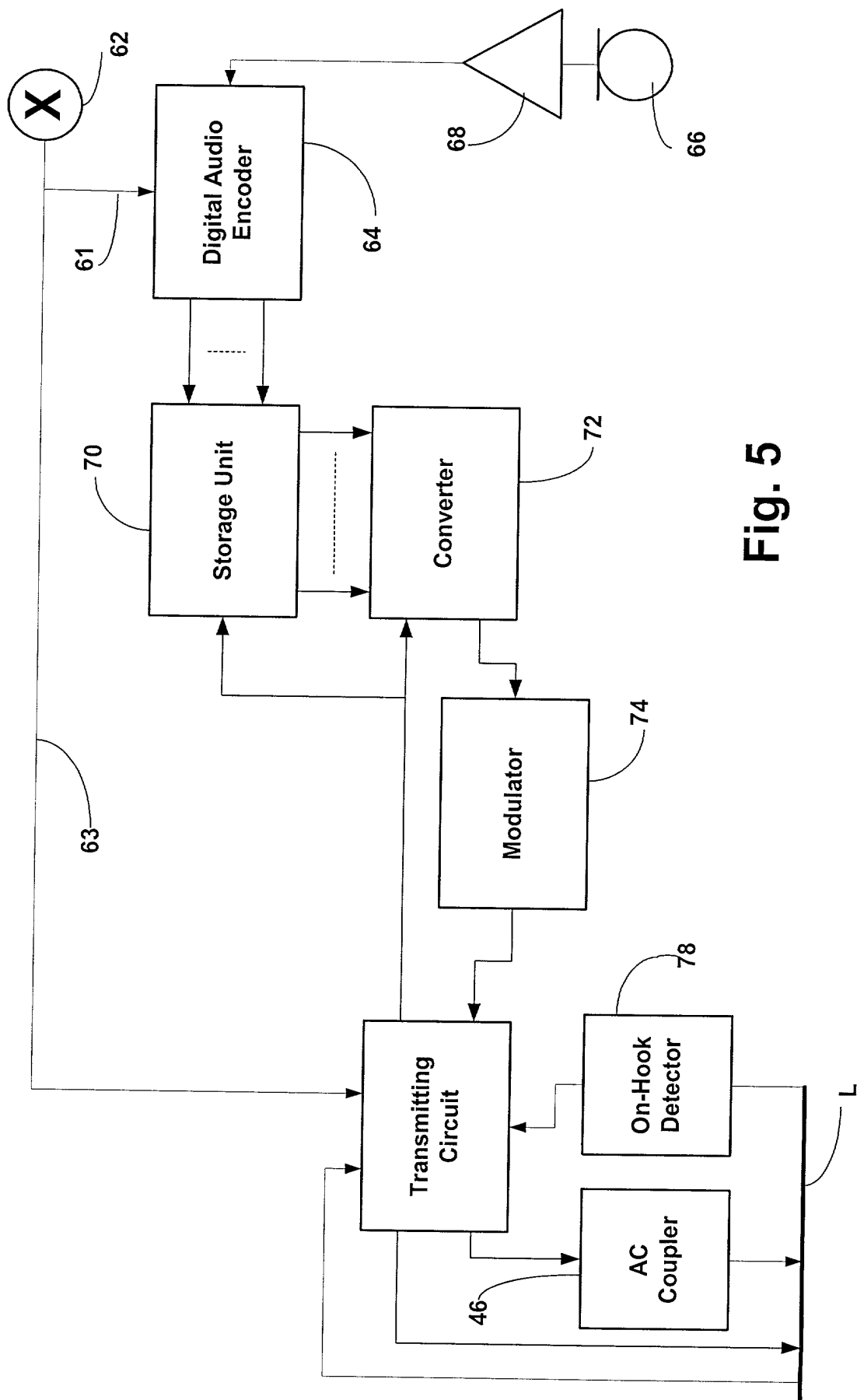


Fig. 5

IN THE UNITED STATES
PATENT AND TRADEMARK OFFICE

Declaration and Power of Attorney

As the below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled **METHOD AND APPARATUS PROVIDING CALLER IDENTIFICATION TELEPHONE SERVICE WITH A REAL TIME AUDIO MESSAGE** the specification of which *is attached hereto* or *was filed on , as application Serial No. .*

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by an amendment, if any, specifically referred to in this oath or declaration.

I acknowledge the duty to disclose all information known to me which is material to patentability as defined in Title 37, Code of Federal Regulations, 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

None

I hereby claim the benefit under Title 35, United States Code, 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, 112, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

None

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I hereby appoint the following attorney(s) with full power of substitution and revocation, to prosecute said application, to make alterations and amendments therein, to receive the patent, and to transact all business in the Patent and Trademark Office connected therewith:

Lester H. Birnbaum	(Reg. No. 25830)
Richard J. Botos	(Reg. No. 32016)
Jeffery J. Brosemer	(Reg. No. 36096)
Kenneth M. Brown	(Reg. No. 37590)
Craig J. Cox	(Reg. No. 39643)
Donald P. Dinella	(Reg. No. 39961)
Guy Eriksen	(Reg. No. 41736)
Martin I. Finston	(Reg. No. 31613)
James H. Fox	(Reg. No. 29379)
William S. Francos	(Reg. No. 38456)
Barry H. Freedman	(Reg. No. 26166)
Julio A. Garceran	(Reg. No. 37138)
Mony R. Ghose	(Reg. No. 38159)
Jimmy Goo	(Reg. No. 36528)
Anthony Grillo	(Reg. No. 36535)
Stephen M. Gurey	(Reg. No. 27336)
John M. Harman	(Reg. No. 38173)
Michael B. Johannesen	(Reg. No. 35557)
Mark A. Kurisko	(Reg. No. 38944)
Irena Lager	(Reg. No. 39260)
Christopher N. Malvone	(Reg. No. 34866)
Scott W. McLellan	(Reg. No. 30776)
Martin G. Meder	(Reg. No. 34674)
John C. Moran	(Reg. No. 30782)
Michael A. Morra	(Reg. No. 28975)
Gregory J. Murgia	(Reg. No. 41209)
Claude R. Narcisse	(Reg. No. 38979)
Joseph J. Opalach	(Reg. No. 36229)
Neil R. Ormos	(Reg. No. 35309)
Eugen E. Pacher	(Reg. No. 29964)
Jack R. Penrod	(Reg. No. 31864)
Daniel J. Piotrowski	(Reg. No. 42079)
Gregory C. Ranieri	(Reg. No. 29695)
Scott J. Rittman	(Reg. No. 39010)
Eugene J. Rosenthal	(Reg. No. 36658)
Bruce S. Schneider	(Reg. No. 27949)
Ronald D. Slusky	(Reg. No. 26585)
David L. Smith	(Reg. No. 30592)
Patricia A. Verlangieri	(Reg. No. 42201)
John P. Veschi	(Reg. No. 39058)
David Volejnicek	(Reg. No. 29355)
Charles L. Warren	(Reg. No. 27407)
Jeffrey M. Weinick	(Reg. No. 36304)

Eli Weiss

(Reg. No. 17765)

I hereby appoint the attorney(s) on ATTACHMENT A as associate attorney(s) in the aforementioned application, with full power solely to prosecute said application, to make alterations and amendments therein, to receive the patent, and to transact all business in the Patent and Trademark Office connected with the prosecution of said application. No other powers are granted to such associate attorney(s) and such associate attorney(s) are specifically denied any power of substitution or revocation.

Full name of sole inventor (or 1st joint inventor): JOSEPH M. CANNON

Inventor's
signature Joseph M. Cannon Date 4-11-2000

Residence: HARLEYSVILLE (MONTGOMERY COUNTY)

Citizenship: USA

Post Office Address: 913 HARCOURT LANE, HARLEYSVILLE,
PENNSYLVANIA 19438

Full name of 2nd joint inventor: LAKSHMI NARAYANA JAMPANABOYANA

Inventor's
signature Lakshmi Narayana Jampayan Date 4-11-2000

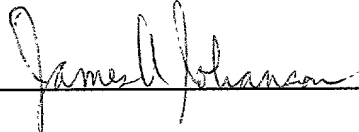
Residence: ALLENTOWN (LEHIGH COUNTY)

Citizenship: INDIA

Post Office Address: 2415 PROSPECT AVENUE, APT. 306, ALLENTOWN,
PENNSYLVANIA 18103

Full name of 3rd joint inventor: JAMES A. JOHANSON

Inventor's
signature



Date 4/11/2000

Residence: MACUNGIE (LEHIGH COUNTY)

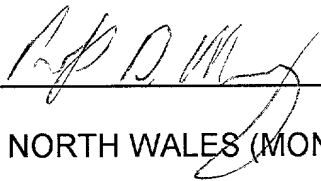
Citizenship: USA

Post Office Address:

6336 LARCH CIRCLE, MACUNGIE, PENNSYLVANIA
18062

Full name of 4TH joint inventor: PHILIP DAVID MOONEY

Inventor's
signature



Date 4/11/2000

Residence: NORTH WALES (MONTGOMERY COUNTY)

Citizenship: USA

Post Office Address:

508 DE KALB PIKE, NORTH WALES, PENNSYLVANIA

ATTACHMENT A

Attorney Name(s): Melvin C. Garner
Joseph B. Lerch

Reg. No.: 26,272
26,936

Telephone calls should be made to **DARBY & DARBY PC** at:

Phone No.: (212) 527-7700

Fax No.: (212) 753-6237

All written communications are to be addressed to:

**DARBY & DARBY PC,
805 THIRD AVENUE, NEW YORK, NEW YORK 10022-7513**